

REMARKS

Claims 1-21 are pending in this application. Claims 11-21 have been withdrawn from consideration by the Examiner for being directed to non-elected subject matter. By this Amendment, the Title is amended to be more clearly indicative of the invention to which Claims 1-10 are directed. Applicants respectfully submit that no new matter is presented herein.

The Title

The Title is objected to for not being descriptive. Applicants respectfully submit the Title has been amended herein to be responsive to the objection. Applicants respectfully request withdrawal of the objection.

Claims 1-10 Recite Patentable Subject Matter

A. Claims 1-6 and 8 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Number 6,783,998 to Nakamura in view of U.S. Patent Number 4,581,099 to Fukaya et al. (hereinafter "Fukaya"). Applicants respectfully traverse the rejection.

The Office Action states Nakamura discloses a first electrode (1) containing PT and formed by etching using fluoride gas, which forms a platinum fluoride on its surface (column 7, line 58 to column 8, line 35); a ferroelectric film (2) of $\text{SRBi}_2\text{Ta}_2\text{O}_9$; and a second electrode (3). The Office Action points to Figure 1(a) and column 4, lines 36-67 to support the statement regarding Nakamura's disclosure.

The Office Action admits Nakamura does not explicitly show, i.e., disclose or teach, the first electrode surface terminated by the fluorine atoms.

To overcome the admitted deficiency in Nakamura, the Office Action applies Fukaya for teaching (Column 4, line 64 to column 5, line 2) that etching with halogen atoms, such as fluorine, terminates the material being etched.

The Office Action then asserts that it would have been obvious to a person of ordinary skill in the art at the time of the invention to terminate the surface of the first electrode of Nakamura since Fukaya teaches that etching with halogen atoms, such as fluorine, terminates the material being etched.

Applicants respectfully disagree with the assertions made by the Office Action for the following reasons.

Applicants note Fukaya teaches etching with halogen atoms, such as fluorine, terminates a surface of the material being etched. However, Applicants respectfully point out that only the portion of the surface exposed in the etching process is terminated by fluorine and that the portion of the surface that is not exposed in the etching process is not terminated by fluorine.

In contrast, Nakamura discloses, see Figure 1 and column 4, lines 36-67, that the patterning of a first electrode (lower electrode) 1 containing PT is carried out together with the dielectric layer 2 and the upper electrode 3, simultaneously, or carried out with respect to all the layers independently. In the situation where the patterning of a first electrode (lower electrode) 1 is carried out together with the dielectric layer 2 and the upper electrode 3 simultaneously, the dielectric layer 2 is formed on the upper surface of the first electrode 1 in an etching process for patterning. In such a process, the upper surface of the first electrode (lower electrode) 1 is not exposed in the etching process for patterning, and therefore, contrary to the position espoused in the Office Action, a

platinum fluoride is not formed on the upper surface of the first electrode (lower electrode) 1 on which the dielectric layer 2 is formed.

In addition, in the situation where the patterning of a first electrode (lower electrode) 1 is carried out independently, an etching mask, such as resist, is formed on the upper surface of the first electrode 1 in the etching process for patterning. In such a process, the upper surface of the first electrode (lower electrode) 1 is also not exposed in the etching process for patterning, and therefore, contrary to the position espoused in the Office Action, a platinum fluoride is not formed on the upper surface of the first electrode (lower electrode) 1 on which the dielectric layer 2 is formed.

To establish *prima facie* obviousness of a rejected claim, each and every feature of the rejected claim must be taught or at least suggested by the applied art of record. See M.P.E.P. §2143.03. Because Fukaya and Nakamura, alone or in combination, fail to teach or suggest each and every feature of Claim 1, Applicants respectfully submit the Office Action has not established *prima facie* obviousness of Claim 1 and that Claim 1 should be deemed allowable over Fukaya and Nakamura at least for this reason.

Moreover, as explained above, in Nakamura, a platinum fluoride is not formed on the upper surface of the first electrode (lower electrode) 1 on which the dielectric layer 2 is formed. As such, even if Fukaya is modified to incorporate the teachings of Nakamura as asserted by the Office Action, because the upper surface of the first electrode 1 in Nakamura is not exposed in the etching process for patterning, the upper surface of the first electrode will not be terminated by fluorine. Accordingly, Applicants respectfully submit that it would not have been obvious to one of ordinary skill in the art at the time of the invention to terminate the upper surface of the first electrode of

Nakamura on which the dielectric layer 2 is formed. Since the combined structure of Nakamura and Fukaya would result in a structure having the upper surface of the first electrode on which the dielectric layer is formed not being terminated by fluorine, such a combination would not result in the structure recited by Claim 1, wherein, in part, it is recited that a dielectric film formed on the surface layer of the first electrode layer is terminated by halogen atoms.

Therefore, Applicants respectfully submit the Office Action has not established a *prima facie* case of obviousness and that Claim 1 should be deemed allowable as the claim is not rendered obvious in view of Nakamura and Fukaya for the reasons discussed above.

Claims 2-6 and 8 depend from Claim 1. It is respectfully submitted that these dependent claims be deemed allowable for at least the same reasons Claim 1 is allowable, as well as for the additional subject matter recited therein.

As such, Applicants respectfully request withdrawal of the rejection.

B. Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Nakamura in view of Fukaya, as applied to Claim 1 above, and further in view of JP 11-068057 to Furukawa. Applicants respectfully traverse the rejection.

Nakamura and Fukaya are discussed above.

Furukawa is applied for teaching that it is known to have a bismuth layer substantially perpendicular to the first electrode to provide a dielectric device with superior polarization characteristics.

The Office Action then asserts that it would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the bismuth layer substantially

perpendicular to the first electrode as taught by Furukawa in the Nakamura device after it has been modified as discussed above according to the applied teachings of Fukaya.

Applicants respectfully submit that Furukawa does not overcome the deficiencies of Nakamura and Fukaya discussed above.

To establish *prima facie* obviousness of a rejected claim, each and every feature of the rejected claim must be taught or at least suggested by the applied art of record. See M.P.E.P. §2143.03. Because Fukaya and Nakamura, alone or in combination, fail to teach or suggest each and every feature of Claim 1, from which Claim 7 depends and includes all of the features thereof, and because Furukawa does not overcome the deficiencies of Fukaya and Nakamura, Applicants respectfully submit the Office Action has not established *prima facie* obviousness of Claim 7 and that Claim 7 should be deemed allowable over Fukaya, Nakamura and Furukawa for at least for this reason.

Furthermore, Applicants respectfully note that in Figure 2 of Furukawa, a crystal structure $\text{Pi}_2\text{Sr}_2\text{CuO}$ constituting the lower and upper electrodes is disclosed. In Figure 3 of Furukawa, a crystal structure of $\text{SrBi}_2\text{Ta}_2\text{O}_9$ constituting a ferroelectric film is disclosed. However, neither Figure 2 or Figure 3 of Furukawa discloses a structure wherein a bismuth layer is formed to be substantially perpendicular to the first electrode layer in the ferroelectric film having a bismuth layer structure as recited in Claim 7.

Additionally, Applicants respectfully note that Furukawa appears to have been filed in the U.S. Patent Office and was accorded serial number 09/137,847. For the convenience of the Examiner, Applicants enclose herein a copy of the specification from the '847 Furukawa patent application.

As such, Applicants respectfully request withdrawal of the rejection.

C. Claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Nakamura in view of Fukaya, as applied to Claim 1 above, and further in view of U.S. Patent Number 6,046,469 to Yamazaki et al. (hereinafter "Yamazaki"). Claim 10 is rejected under 35 U.S.C. §103(a) as being unpatentable over Nakamura in view of Fukaya and Yamazaki, as applied to Claim 1 above, and further in view of U.S. Patent Number 6,320,213 to Kirlin et al. (hereinafter "Kirlin"). Applicants respectfully traverse both rejections.

Nakamura and Fukaya are discussed above.

Yamazaki is applied for teaching that it is known to form an adherent layer under a first electrode to provide a semiconductor device with good ohmic characteristics.

Kirlin is applied for teaching that it is known to use IrSiN to reduce the diffusion of aluminum and platinum.

Applicants respectfully submit that Yamazaki, as well as Kirlin, do not overcome the deficiencies of Nakamura and Fukaya discussed above.

To establish *prima facie* obviousness of a rejected claim, each and every feature of the rejected claim must be taught or at least suggested by the applied art of record. See M.P.E.P. §2143.03. Because Fukaya and Nakamura, alone or in combination, fail to teach or suggest each and every feature of Claim 1, from which Claims 9 and 10 depend and include all of the features thereof, and because Yamazaki and/or Kirlin do not overcome the deficiencies of Fukaya and Nakamura, Applicants respectfully submit the Office Action has not established *prima facie* obviousness of Claims 9 and 10 and that Claims 9 and 10 should be deemed allowable over Fukaya, Nakamura, Yamazaki, and Kirlin, alone or in combination.

As such, Applicants respectfully request withdrawal of both rejections.

Examiner Initialed Form PTO-1449

Applicants respectfully note reference (AM) on the Form PTO-1449 attached to the Office Action and submitted with the Information Disclosure Statement filed August 1, 2003, was not initialed by the Examiner indicating the reference was considered by the Examiner. As such, for the convenience of the Examiner, Applicants attach hereto the Form PTO-1449 citing reference AM. Applicants respectfully request the Examiner consider the reference and acknowledge such by returning an initialed copy of the Form 1449.

Conclusion

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding objection and rejections, allowance of Claims 1-10, and the prompt issuance of a Notice of Allowability are respectfully solicited.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to Counsel's Deposit Account No. 01-2300, **referencing Attorney Docket Number 024808-00014.**

Respectfully submitted,
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Enclosure: Copy of Specification of JP 11-068057 to Furukawa
PTO Form 1449

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